Claims

1. A heat exchange module for a motor vehicle with internal combustion engine fitted with a high temperature cooling system (2), particularly for cooling the engine (8), and a low temperature system (4) for cooling the vehicle's equipment (32), the module (22, 122) comprising at least one row of heat exchange tubes (50, 152, 154, 156) connected to at least one inlet manifold (58, 62) and to at least one outlet manifold (60, 64), these tubes forming a heat exchange surface (50), characterized in that it comprises surface distribution means (40, 42, 44, 46) which can be used to divide, advantageously in modulatable manner, the heat exchange surface (50) into a high temperature heat exchange section used for cooling the high temperature system and a low temperature heat exchange section used for cooling the low temperature system.

2. The heat exchange module as claimed in claim 1, characterized in that it comprises a high temperature fixed heat exchange section (52) permanently built into the high temperature cooling system (2); a low temperature fixed heat exchange section (54) permanently built into the low temperature cooling system (4) and an allocatable heat section (56) comprising an allocatable inlet manifold (66) and an allocatable outlet manifold (68) that can be allocated wholly or partly either to the high temperature fixed heat exchange section (52) or to the low temperature fixed heat exchange section (54).

3. The heat exchange module as claimed in claim 2, characterized in that it comprises a single row of tubes.

4. The heat exchange module as claimed in claim 2, characterized in that it comprises a first and a second row of tubes (72, 74), the first of these rows (72) belonging either to the fixed heat exchange section (52) of the high temperature system, or to the fixed heat exchange section (54b) of the low temperature cooling system, the second row of tubes (72) being divided into a high temperature fixed section (52), into a low temperature fixed section (54b), and an intermediate allocatable heat section (56), the high temperature section, respectively the low temperature section, being connected in series to the first row of tubes (72).

5. The heat exchange module as claimed in claim 2, characterized in that it comprises three rows of tubes, the first row (152) belonging to the fixed heat exchange section of the high temperature system (2), the second row (154) belonging to the fixed exchange section of the low temperature system ~~(4), the third row (156) belonging~~ to the intermediate allocatable heat exchange section.

6. The heat exchange module as claimed in claim 2, characterized in that it comprises a row of U-shaped tubes () each of which communicates on the one hand with the allocatable inlet manifold (66) and on the other hand with the allocatable outlet manifold (68).

7. The heat exchange module as claimed in one of claims 2 to 6, characterized in that the surface distribution means (42) consist of adjustable means (110; 212) of partitioning the allocatable inlet manifold (66) and of adjustable means (110; 212) of partitioning the allocatable outlet manifold (68), these partitioning means being used to divide in modulatable manner the allocatable

inlet manifold (66) into a high temperature allocatable inlet chamber and a low temperature allocatable inlet chamber, and the allocatable outlet manifold into a high temperature allocatable outlet chamber and a low temperature allocatable outlet chamber, the distribution of the allocatable inlet manifold (66) and of the allocatable outlet manifold (68) between these chambers being adjustable.

8. The heat exchange module as claimed in claim 7, characterized in that the means of partitioning the allocatable inlet manifold (66) and the allocatable outlet manifold (68) are continuously adjustable.

9. The heat exchange module as claimed in claim 8, characterized in that the continuously adjustable partitioning means consist of a piston (110; 212) mounted slidingly in the allocatable inlet manifold (66) and of a piston (110; 212) mounted slidingly in the allocatable outlet manifold (68), these pistons being moved by actuator means (44; 220).

10. The heat exchange module as claimed in claim 8, characterized in that the actuator means consist of worm screws (42; 214) rotated by actuators (44) outside the manifolds (62, 64).

11. The heat exchange module as claimed in claim 7, characterized in that the means of partitioning the allocatable inlet manifold (66) and the allocatable outlet manifold are adjustable discretely.

12. The heat exchange module as claimed in claim 11, characterized in that the discretely adjustable partitioning means consist of a series of

partitions (122) actuated by actuators (124) distributed along the length of the allocatable inlet manifold (66) and along the length of the allocatable outlet manifold (68), each of these partitions (122) being capable of dividing the allocatable inlet manifold (66), respectively at the allocatable outlet manifold (68), into two chambers.

13. The heat exchange module as claimed in claim 12, characterized in that the partitions (122) are isolated from the fluid environment of the heat exchange module (22, 122) by sealing membranes (130) and in that they are actuated by actuators (124) outside the two manifolds (66, 68).

14. The heat exchange module as claimed in one of claims 2 to 6, characterized in that it comprises switching means (172, 180) which are used to connect the whole allocatable heat exchange surface (156), either to the high temperature fixed heat exchange section (152), or to the low temperature fixed heat exchange section (154).

15. The heat exchange module as claimed in claim 14, characterized in that the switching means consist of orifices (162, 164, 166, 168) provided between the manifolds of the high temperature and low temperature fixed sections and the manifolds of the intermediate allocatable heat exchange section, and of valves (172, 180) which are used selectively to open or close these orifices.

16. The heat exchange module as claimed in claim 15, characterized in that the valves (172, 180) are connected by a rod (174, 182) to a control member (176, 184) outside the manifolds (58, 60).

17. The heat exchange module as claimed in one of claims 1 to 16, characterized in that it comprises logical means (46) of controlling the heat exchange surface distribution means (42) which receive information on control parameters such as the water temperature of the high temperature system (2) and low temperature system (4), the engine load, the engine speed, the power transferred by the engine (8) to the water, at least one of these parameters governing the heat exchange surface distribution.

18. The heat exchange module as claimed in one of claims 4 to 17, characterized in that it comprises cooling fins (104) common to all the rows of the module.

19. The heat exchange module as claimed in one of claims 4 to 18, characterized in that the manifolds consist of a manifold plate and a cover assembled by welding.

20. The heat exchange module as claimed in one of claims 4 to 18, characterized in that the manifolds consist of a manifold plate and a cover, particularly made of plastic, attached mechanically to the manifold.

21. A system of managing the thermal energy developed by a motor vehicle internal combustion engine, comprising a high temperature cooling system (2) comprising a high temperature radiator to cool the vehicle's engine (8) and a low temperature cooling system comprising a low temperature radiator for cooling the vehicle's equipment (32), characterized in that the high temperature radiator consists of the high temperature heat exchange section of a heat exchange module (22) according to one of claims 1 to 20, and in that

the low temperature radiator consists of the low temperature heat exchange section of that same module.

22. The thermal energy management system as claimed in claim 21, characterized in that it comprises logical means (46) for controlling the heat exchange surface distribution means (42) coupled to a system of managing, via a four-way valve (12), the cooling of the engine (8), the valve (72) comprising an inlet way (12-1) at the outlet of the engine (8) and three outlet ways, a first way (12-2) connected to the unit heater (18), a second way (12-3) connected to the heat exchange module (22) and a fourth way (12-4) connected to the short-circuit pipe (24).